Three new *Acacia* species (Fabaceae: Mimosoideae) from East Gippsland, Victoria

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Introduction

During field studies in 1985 in the eastern sector of the Benambra–Limestone Road, East Gippsland, we observed three *Acacia* taxa of dwarfed stature occurring sympatrically amongst a number of other free-flowering and free-seeding *Acacia* species. One of these taxa (here described as *Acacia infecunda*) appeared to have affinities with *A. boormanii* and a second taxon (here described as *A. nanopravissima*) showed affinity with *A. pravissima*. The affinities of the third taxon (here described as *Acacia tabula*) did not appear to be with any known taxon although a superficial similarity has suggested a relationship with *Acacia buxifolia* (Maslin 1996c, 2001c, Ross & Walsh 2003, Walsh & Stajsic 2007).

Subsequent morphometric and flavonoid analyses (Molyneux and Whiffin unpub. data) suggested that *A. tabula* is likely to be a stabilised hybrid between ancestral forms of *A. infecunda* and *A. nanopravissima*. While both *A. infecunda* and *A. tabula* are only known from the type locality, *A. nanopravissima* is known from a second small population at a site 3.5 km to the east of the type locality. Here it is represented by five ramets.

On specimens lodged earlier at MEL, we recorded much smaller population sizes for two of these taxa than subsequent investigation demonstrated. Prior to the January 2003 wildfires, the three new species were represented by approximately 50 mature 'plants' (ramets or stems) of *A. infecunda*, approximately 130 mature 'plants' of *A. nanopravissima* (MEL 1587015 noted approximately 40 plants) and approximately 140 mature 'plants' of *A. tabula* (MEL 1587014 noted 200 plants).

In February 2004, Carter (2004) only recorded approximately 50 reshooting ramets of *A. nanopravissima* and no regeneration of either *A. infecunda* or *A. tabula*. In February 2005 we recorded about 75 ramets of *A. nanopravissima*, 8 ramets of *A. infecunda* and 30 ramets of *A. tabula*, indicating that two years after the fires, regeneration, although initially slow, had occurred for all three species.

In over twenty-two years of field observations and growing trials, we have not observed any seed set on any of the three taxa, nor have we observed any incipient pods. Unpublished electroscan microscopy (SEM) undertaken at Monash University in July 1993 by Gunta Jaudzems clearly shows four pollen grains escaping an anther of *A. nanopravissima*.

Abstract

Three new species of *Acacia* with restricted known distribution in the Alpine National Park, East Gippsland, *Acacia infecunda*, *Acacia nanopravissima* and *Acacia tabula*, are described and illustrated. The postulated origin of *A. tabula* is discussed, utilising both morphometric and flavonoid information (Molyneux and Whiffin unpub. data) and the relationship between *A. infecunda* and *Acacia boormanii* is discussed, as is the relationship between *A. nanopravissima* and *Acacia pravissima*. The three new species are free-flowering but apparently infecund and appear to spread vegetatively by ramet formation from root suckers.

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(Micrograph 4, 35 mm transparencies of these images are available on request). Jaudzems, in a report of 26 July 1993 to one of us (WMM), stated that she had carried out viability tests on 47 grains of pollen collected from the anthers of *A. nanopravissima* and tested their viability using the method of O'Brien and McCully (1981). Jaudzems stated that tests showed that 68% of the pollen was viable, 21% questionably viable, and 11% was non-viable. Jaudzems also stated that this level of viability was low when compared with related species, but suggested that non-viability would not appear to be the reason for infecundity in *A. nanopravissima*. In another set of SEM scans, five rows of distinctly collapsed ovules are evident in a specimen of *A. tabula*. We offer no explanation for the lack of seed production but suggest it may be due to an as yet unrecognised post-zygotic event.

Taxonomy

1. Acacia infecunda Molyneux & Forrester *sp. nov.*

Ab A. boormanii Maiden habitu minore obligato repullulanti a radicibus, sterilibus, capitulis et phyllodiis minoribus differt.

Type: VICTORIA: near Benambra-Limestone Road, 14.viii.1995, W.M. Molyneux and S.G. Forrester. *s.n.* MEL 2312468 (holo: MEL; iso: AD, BRI, HO, NSW, PERTH).

A small erect shrub 30–60 (–120) cm high, 40–60 cm wide, extending asexually by the production of ramets; branchlets glabrous. Phyllodes linear, 12–41 mm long, 0.8–2.2 mm wide, straight, obliquely and excentrically mucronate, thin, grey-green, glabrous; mid nerve evident or obscure, anastomosing nerves absent, adaxial and abaxial width equal; gland small, not prominent, 4.8 (–11.5) mm above pulvinus. Inflorescence racemose; flower heads globular, axillary, one per axil; raceme axis (3–) 10–30 (–40) mm long; racemes of (5–) 8–10 heads. Peduncles 1.5–4 mm long. Flowers five-merous, 3–5 mm diameter, 5–9 flowers per head, golden, infecund.

Representative specimen examined: **VICTORIA:** Splitters Creek crossing, Limestone Creek Raad. Natmap 8524 Jacobs River 1:100,000 FV055095, 30.iv.1986, Molyneux & Forrester *s.n.*

Distribution: Acacia infecunda is apparently endemic to the Wulgulmerang district in East Gippsland, Victoria, where it is currently known by a single small population on the Wombargo Range in the upper catchment of Little River, a tributary of the Snowy River. The population comprises small fragmented stands in close proximity

Figure 1. Marphology of the three new *Acacia* species. Fram left to right: *Acacia infecunda, A. tabula and A. nanapravissima.*

extending along an approximate north-east to south-west line on a rocky slope near Benambra-Limestone Road.

Conservation Status: Using the criteria of the IUCN (2001), the species would be assessed as critically endangered, with a conservation code of CR D, on account of its exceedingly small population size, which may comprise no more than a single genetic individual or genet, which renders the species highly susceptible to fire or other stochastic events.

Habitat: The three new taxa share a dry woodland and heathland habitat on rocky slopes with soils derived from Devonian acid rhyolites. Associated understorey species include members of the Ericaceae, Dilleniaceae, Myrtaceae and Poaceae with an overstorey dominated by *Eucalyptus pauciflora, E. rubida* and *E.* sp. aff. *dives. Acacia amoena, A. gunnii* and *A. kybeanensis,* all of which are fecund, are also found growing in close proximity to the three new taxa.

Phenology: Flowers late August to early October.

Notes: Maslin (1996a, 2001a) notes that a "slow-growing dwarf variant" of *A. boormanii* occurs on high rocky ground at Splitters Creek, in the upper catchment of Little River, between Suggan Buggan and Wulgulmerang. Maslin (2001d) lists the species as *Acacia infecunda* Molyneux (ms). The new species is listed as *Acacia* sp. aff. *boormanii* (Wulgulmerang) in the seventh and eighth editions of A Census of the Vascular Plants of Victoria (Ross & Walsh 2003, Walsh & Stajsic 2007).

Etymology: The specific epithet refers to the apparent infecund nature of the species compared to the closely related *A. boormanii.*

Recommended English name: **Famine Wattle**

2. *Acacia nanopravissima* Molyneux & Forrester *sp. nov.*

Ab A. pravissima phyllodiis et inflorescentibus minoribus, plerumque habitu minoribus e fructibus non evolutis differt.

Type: VICTORIA: near Benambra-Limestone Road, 27.viii.1993, W.M. Molyneux and S.G. Forrester *s.n.* (holo: MEL 2312470; iso: AD, BRI, NSW, PERTH).

A small erect shrub 40–60 (–100) cm high, 25–40 cm wide, extending asexually by the production of ramets; branchlets glabrous. Phyllodes 3–8 mm long, 4–8 mm wide, strongly inequilateral, generally obdeltate, with the adaxial margin conspicuously rounded, grey-green, glabrous, imperfectly two-nerved, anastomosing nerves absent, adaxial width greater than abaxial width; gland prominent, (1.6–) 2.3–3.7 (–4.5) mm above pulvinus. Inflorescence, racemose, flower heads globular, axillary, one per axil; raceme axis (5–) 12–27 (–60) mm long, racemes of (8–) 6–10 heads. Peduncles 2–4 mm long. Flowers five-merous, 3–4 mm diameter, 7–9 flowers per head, golden, infecund.

Representative specimens examined: **VICTORIA:** Splitters Creek, Wulgulmerang, 11.i.1949, N.A.Wakefield *s.n.*: MEL 544638 (as *Acacia pravissima*); Little River, Black Mountain, 13.i.1949, N.A.Wakefield *s.n.* (as *Acacia pravissima*); Little River at Rockbank, Wulgulmerang, 'very localised', 29.xi.1962, J.H. Willis *s.n.*: MEL 1500988 (as *Acacia pravissima*); Wulgulmerang, Little River, 15.i.1971, A.C. Beauglehole: MEL 563409; Cultivated at Dixons Creek, 30.iv.1986, Molyneux & Forrester *s.n.*: MEL 252761; Splitters Creek crossing, Limestone Creek Road, c. 5.5 km west of Wulgulmerang-Suggan Buggan Road, 30.iv.1986, Molyneux & Forrester *s.n.*: MEL 1545132; Splitters Creek crossing, Limestone Creek Road, 22.ix.1990, Molyneux & Forrester *s.n.*: MEL 1587015.

Distribution: Acacia nanopravissima is apparently endemic to the Wulgulmerang district in East Gippsland, Victoria, where it is currently known by a single small population on the Wombargo Range in the upper catchment of Little River, a tributary of the Snowy River. The population comprises small fragmented stands in close proximity extending across a slope overlooking and south of Splitters Creek, a tributary of Little River, near Benambra-Limestone Road, with one small isolated stand of five plants on either side of Little River, east of the Splitters Creek subpopulation and east of the Benambra-Limestone Road.

Conservation Status: Using the criteria of the IUCN (2001), the species would be assessed as critically endangered, with a conservation code of CR D, on account of its exceedingly small population size, which may comprise no more than two genetic individuals or genets, which renders the species highly susceptible to fire or other stochastic events.

Habitat: The species occurs in dry woodland and heathland habitat on rocky slopes with soils derived from Devonian acid rhyolites. Associated understorey species include members of the Ericaceae, Dilleniaceae, Myrtaceae and Poaceae with an overstorey dominated by *Eucalyptus pauciflora, E. rubida* and *E.* sp. aff. *dives. Acacia amoena, A. gunnii* and *A. kybeanensis,* all of which

Table 1. Comparison of morphological characters for five species of *Acacia*: *Acacia infecunda, Acacia boormanii, Acacia nanopravissima, Acacia pravissima* and *Acacia tabula.*

Character	*A. infecunda*	*A. baarmanii*	*A. nanopravissima*	*A. pravissima*	*A. tabula*
Habit					
Size	Small, root-suckering shrub	Small to large shrub	Small root-suckering shrub	Medium to large shrub	Small root-suckering shrub
Shape	Erect	Erect to spreading	Erect	Spreading	Erect
Height	0.3–0.6 (-1.20) m	0.5–5 m	0.4-0.6 (-1) m	(0.5-) 3–8 m	0.25–0.50 m
Width	0.4–0.6 m	1–5 m	0.25–0.4 m	(1-) 4–8 m	0.20–0.45 m
Phyllodes					
Shape	Linear, excentrically mucronate	Linear or occasionally subterete, excentrically mucronate	Strongly inequilateral, generally obdeltate, adaxial margin conspicuously rounded	Strongly inequilateral generally obdeltate, adaxial margin conspicuously rounded	Inequilaterally narrowly oblong, elliptical, excentrically mucronate
Nerve	Single, adaxial and abaxial width equal	Single, adaxial and abaxial width equal	Imperfectly two-nerved, adaxial width greater than abaxial	Imperfectly two-nerved, adaxial width greater than abaxial	Single, adaxial width mostly greater than abaxial, occasionally equal
Gland	Single 4–8 (-11.5) mm above pulvinus	Single 2.5–10 (-19) mm above pulvinus	Single 1.6–3.7 (-4.5) mm above pulvinus	Single 1.5–5.5 (-9.5) mm above pulvinus	Single 1.5–4.4 (-6.5) mm above pulvinus
Length	12–41 mm	25–90 mm	3–8 mm	6–20 mm	6–17 mm
Width	0.8–2.2 mm	0.5–3 mm	4–8 mm	4–20 mm	0.8–2.5 (-4.2) mm
Inflorescences					
Arrangement	racemose	racemose	racemose	racemose	racemose
Axis length	(3-) 10–30 (-40) mm	30–60 mm	(5-) 12–27 (-60) mm	50–100 mm	(5-) 8–10 (-12) mm
Heads per raceme	(5-) 8–10	5–10	6–10	10–12	5–10
Peduncle length	1.5–4 mm	3–4 mm	2–4 mm	4–6 mm	1.5–3 mm
Flowerheads					
Flowerhead shape	globular	globular	globular	globular	globular
Diameter	3–5 mm	6–8 mm	3–4 mm	5–6 mm	3–5 mm
Flower number per head	5–9	5–10	7–9	8–12	5-8
Seed					
	Unknown	Yes	Unknown	Yes	Unknown
Suckering					
	Obligate	Occasionally	Obligate	Not known for sucker	Obligate

are fecund, are also found growing in close proximity to the species. The small outlying stand on Little River is associated with *Bursaria spinosa* and *Lepidosperma laterale* below an overstorey dominated by *E. camphora*.

Phenology: Flowers late August to early October.

Notes: Maslin (1996b, 2001b) notes that a "dwarf variant" of *A. pravissima* occurs at Splitters Creek, in the upper catchment of Little River, between Suggan Buggan and Wulgulmerang. Maslin (2001d) lists the species as *Acacia nanopravissima* Molyneux (ms). The new species is listed as *Acacia* sp. aff. *pravissima* (Wulgulmerang) in the seventh and eighth editions of A Census of the Vascular Plants of Victoria (Ross & Walsh 2003, Walsh & Stajsic 2007).

Etymology: The specific epithet refers to the species being smaller in all its parts to the closely related *A. pravissima*.

Recommended English name: **Little Kooka Wattle**

3. *Acacia tabula* Molyneux & Forrester *sp. nov.*

Ab A. infecunda *Molyneux & Forrester phyllodiis brevioribus latioribus asymmetricis differt; ab A. nanopravissima Molyneux & Forrester phyllodiis anguste oblingis differt.*

Type: VICTORIA: near Benambra-Limestone Creek Road, 22.x.1990, W.M. Molyneux and S.G. Forrester *s.n.* MEL 2312472 (holo: MEL; iso: AD, HO, NSW, PERTH).

A small erect shrub 25–50 cm high, 20–45 cm wide; extending asexually by the production of ramets; branchlets glabrous. Phyllodes 6–17 mm long, 0.8–2.5 (–4.2) mm wide, inequilateral, narrowly oblong, elliptical, excentrically mucronate, grey-green, glabrous; mid-nerve evident, adaxial width mostly wider than abaxial, seldom of equal width; gland evident, 1.5–4.5 (–6.5) mm above pulvinus. Inflorescence racemose; flower heads globular, axillary, one per axil; raceme axis (5–) 8–10 (–12) mm long, racemes of (5–) 8–10 heads. Peduncles 1.5–3 mm long. Flowers five-merous, 3–4 mm diameter, 5–8 flowers per head, yellow, infecund.

Representative specimens examined: **VICTORIA:** Splitters Creek, 9.ix.1962, Keith C. Rogers, *s.n.*: MEL 600258 (as *Acacia buxifalia*); Splitters Creek 2, 3.xii.1962, J.H. Willis *s.n.*: MEL 1500159 (as *Acacia* sp.); 'dry hills in *Eucalyptus maculasa* [*E. mannifera*], *E. dives* forest associated with *Acacia pravissima*' [*A. nanopravissima*], 3.xii.1962, J.H. Willis *s.n.*: MEL 1500159 (as *Acacia buxifalia*); Splitters Creek above Limestone Creek Road, 30.iv.1986, Molyneux & Forrester *s.n.*: MEL 1545133; Splitters Creek *c.* 10 km south-west of Suggan Buggan, 9.ix.1962, K.C. Rogers *s.n.*: MEL 600258; Map Ref: 8524 Jacobs River FV092053, 22.ix.1990, Molyneux & Forrester *s.n.*: MEL 1587014.

Distribution: Acacia tabula is apparently endemic to the Wulgulmerang district in East Gippsland, Victoria, where it is currently known by a single small population on the Wombargo Range in the upper catchment of Little River, a tributary of the Snowy River. The population comprises small fragmented stands in close proximity extending across a slope overlooking and south of Splitters Creek, near Benambra-Limestone Road.

Conservation Status: Using the criteria of the IUCN (2001), the species would be assessed as critically endangered, with a conservation code of CR D, on account of its exceedingly small population size, which may comprise no more than a single genetic individual or genet, which renders the species highly susceptible to fire or other stochastic events.

Habitat: The species occurs in dry woodland and heathland habitat on rocky slopes with soils derived from Devonian acid rhyolites. Associated understorey species include members of the Ericaceae, Dilleniaceae, Myrtaceae and Poaceae with an overstorey dominated by *Eucalyptus. pauciflora, E. rubida* and *E.* sp. aff. *dives*. *Acacia amoena, A. gunnii* and *A. kybeanensis,* all of which are fecund, are also found growing in close proximity to the species.

Phenology: Flowers late August to early October.

Notes: Maslin (1996c, 2001c) notes that a "dwarf variant" of *A. buxifolia* subsp. *buxifolia* occurs at Splitters Creek, in the upper catchment of Little River, between Suggan Buggan and Wulgulmerang. Maslin (2001d) lists the species as *Acacia tabula* Molyneux (ms). The new species is listed as *Acacia* sp. aff. *buxifolia* (Wulgulmerang) in the seventh and eighth editions of A Census of the Vascular Plants of Victoria (Ross & Walsh 2003, Walsh & Stajsic 2007).

Etymology: The specific epithet derives from the Latin *tabula*, a plank or board. The nearby Splitters Creek was so named for the activities of timber workers who cut and split planks for farm buildings in the district.

Recommended English name: **Wombargo Wattle**

Discussion

While *Acacia infecunda* has an apparent affinity with *A. boormanii,* and *A. nanopravissima* an affinity with *A.*

pravissima, they are genetically isolated from these species by geographic location, and appear to have been so over a long period. The nearest stands of *A. boormanii* are on the Snowy River some 20 km to the east and at a much lower elevation. The nearest stands of *A. pravissima* are on the upper Gibbo River on the Benambra-Corryong Road some 90 km to the north-west of the type locality for the three new taxa. While such separation of populations is not uncommon for *A. boormanii* or *A. pravissima*, the dwarfed nature, infecund state and limited population size and range suggest an isolating event which has caused local populations of *A. infecunda* and *A. nanopravissima* to have evolved such states in a limited area and perhaps under a severe climatic regime. Such isolation may have been associated with a glacial event on the Kosciuszko Plateau in the Late Quaternary. Hills (1975) states that periglacial conditions would have existed in the form of permafrost at that time around the Cobberas and Mt Wombargo. It was to this event that he attributes the development of the extensive 'rock rivers' in both these regions. Mount Wombargo is situated only 4 km to the north-west of the Type locality for the three new taxa and it would seem reasonable to postulate that *Acacia* populations in the region could have adapted to and survived these prolonged geological events by dramatic morphological reduction in stature and organ size and reproductive strategy.

The sympatric occurrence of the new taxa with free-seeding *Acacia* species such as *A. amoena*, *A. gunnii* and *A. kybeanensis* (pers. obs.) suggest recent migration by these species to the area from sites at lower elevations as the climate warmed during the Holocene. McKenzie (1997), who constructed pollen profiles from the late Quaternary for Victorian sites above 900 m elevation, demonstrates that much of the herbaceous alpine flora disappeared at ± 13,500 BP, to be replaced by upwardly migrating *Acacia*, *Eucalyptus*, *Nothofagus* and *Pomaderris* species as the climate became warmer. *Acacia infecunda*, *A. nanopravissima* and *A. tabula* may not be the only taxa to have been modified by localised past events. On a slope above Native Dog Flat, in the Upper Buchan River catchment, we have recorded a population of *Hakea* with affinities to *Hakea lissosperma*. This entity, which covers an area of approximately 0.2 ha, is dwarfed in habit (mostly under 1 m), extends by ramets and, whilst free-flowering, is also infecund.

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